

5th Confirmatory Sampling
No Data see pg 14

10/3/96 David Miller

The site has a revised table
listing the sampling locations
intended for final
report. Lab. began used table
submitted for this table to enter
the data base.

**PROPOSAL FOR
CONFIRMATORY SAMPLING NO FURTHER ACTION
ENVIRONMENTAL RESTORATION SITE, 211
OPERABLE UNIT 1302**

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Prepared for the
U. S. Department of Energy

**PROPOSAL FOR CONFIRMATORY SAMPLING NO FURTHER ACTION
ENVIRONMENTAL RESTORATION SITE 211, BUILDING 840 FORMER
UNDERGROUND STORAGE TANK 840-1**

OPERABLE UNIT 1302

1.0 INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a No Further Action (NFA) decision for Environmental Restoration (ER) Site 211 based on confirmatory sampling (NFA Criterion 5, NMED et al. 1995).

1.1 ER Site Identification Number and Name

ER Site 211 (herein referred to as the site) is the Building 840 Former UST 840-1, and is included in Operable Unit 1302. This site was original evaluated under ADS 1300, Underground Storage Tanks (UST) and administratively transferred to the ADS 1302 on August 15, 1995. The original ER site name was Building 840-1 UST (TA-I). The ER site name was changed to the Building 840 Former UST 840-1 during the development of the TA-I RFI Work Plan (SNL/NM, 1995).

1.2 SNL/NM NFA Process

The basis for proposing an NFA with confirmatory sampling is throughly described in Section 4.5.3. of the Draft *Program Implementation Plan (PIP) for Albuquerque Potential Release Sites* (SNL/NM, 1994), and in Annex B of the *Environmental Restoration Document of Understanding* (NMED, 1995). ER Site 211 is being proposed for a confirmatory sampling NFA decision based on NFA Criterion 5: The potential release site (PRS) has been characterized in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

1.3 Local Setting

This former underground storage tank (UST) site is located southeast of Building 840 at the intersection of H and 9th Streets, inside the north central portion of TA-1 secured area (Appendix A, Figure 1). The 500-gallon tank stored waste water from the ceramic shop housed in the building. Prior to its use for waste water coolant storage, the tank was used to store waste oil coolant from the machining operations.

2.0 HISTORY OF THE SWMU

This section provides a summary of the historical information that has been obtained at the site.

2.1 Sources of Supporting Information

Information regarding the site is provided in the following documents:

- *Final RCRA Facilities Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico* (EPA, 1987).
- *Hazardous and Solid Waste Amendments Permit for Sandia National Laboratories, EPA I.D. No NM 5890110518* (EPA, 1992).
- *Program Implementation Plan for Albuquerque Potential Release Sites [Draft]* (SNL/NM, 1994a).
- *Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan* (SNL/NM, 1995).

2.2 Previous Audits, Inspections, and Findings

The tank was removed on February 23, 1989. A field investigation was conducted to characterize the soil in the tank excavation (see Section 3.4). The results of the soil sampling were inadequate to conclude that an NFA was warranted for this site because metal analyses were not performed on the soil samples.

2.3 Historical Operations

ER Site 211 is a former steel UST location near Building 840 in TA-I that was operational from 1954 until 1989. The tank was registered with the NMED UST Bureau as UST No. 840-1. The UST had a capacity of 500 gallons and, at the time of its removal, stored waste water from the ceramic shop housed in the building. The waste water, derived from coolant water used in milling and machining operations, reportedly contained lead titanite and lead oxides. Release of waste water from the UST to the environment has been attributed to tank operator spillage (Bohannon 1989). Information suggests that prior to its use for waste water coolant storage, the tank was used to store waste oil coolant from the machining operations.

No inventory control or precision testing data about the tank were maintained. No piping was connected from the building to the tank and it was apparently hand-filled from a port on its southeast end. The base of the tank was at a depth of about 4 ft bgs; no information has been located that indicates it was ever mounted to a concrete pad. The tank did not have secondary containment, overfill protection, or leak detection systems. About one foot of earthen fill material covered the tank, including several inches of concrete pavement. The soil immediately underlying the tank site consists of unconsolidated sand and gravel.

The tank was removed on February 23, 1989 as part of a routine tank upgrade project. Prior to the tank pull, no releases had been officially reported for the UST system. Several SNL/NM and contractor organizations were involved in the tank removal operation (Helgesen 1990; Stanford 1989). SNL/NM and IT Corporation personnel

collected water samples from the tank and soil samples from beneath the tank (IT Corp. 1989a, b). Regulatory agency personnel were informed of the tank removal but did not observe the operation.

To remove the UST, a 13-ft by 6-ft excavation was dug to an average depth of 4.5 ft. Stained soil was not visible in the tank excavation. The tank was visually inspected during the tank removal operation; no perforations were evident. After soil samples were collected, the tank excavation was backfilled with clean sand and paved with concrete (IT Corp. 1989b). Volatile concentrations in the soil as determined using a field headspace method were below the 100 ppm (mg/kg) TPH guidance standard set by NMED for UST sites. SNL/NM sent a tank closure notification letter to the NMED UST Bureau on May 12, 1990 (Bohannon 1989). At this date, a closure acceptance letter has not been received from NMED.

3.0 EVALUATION OF RELEVANT EVIDENCE

This section provides a summary of the previous investigations associated with Site 211.

3.1 Unit Characteristics

Since the tank was removed, no system safeguards remain in effect. The ER Site 211 RFI was conducted to determine if past practices contributed to possible soil contamination (see Section 3.6).

3.2 Operating Practices

No operational procedures were known to exist for this former UST. Hazardous wastes were never managed or contained in the 840-1 tank.

3.3 Presence or Absence of Visual Evidence

No visual evidence of hazardous waste constituents were seen on the surface or in soil samples collected for chemical analysis during the ER Site 211 RFI field investigation.

3.4 Results of Previous Sampling Surveys

The tank contents were sampled on October 5, 1988, in preparation for tank removal, and analyzed for metals and TOX. Separate liquid phases were observed at the liquid surface in the tank. Therefore, a peristaltic pump was used to make one composite liquid sample with water collected at 6-in. depth intervals throughout the tank. Upon receipt of an elevated TOX analysis, a second water sample was collected on October 28, 1988, with a Coliwasa sampler to determine the identity of the halogenated compounds. Both water samples were analyzed at an off-site analytical laboratory (IT Corp. 1989a).

In the original sample, ten metals were detected; copper had the greatest concentration at 25.0 mg/L (ppm). The concentration of TOX in the original sample was 2.1 mg/L (ppm). In the second waste water sample acetone was detected at a concentration of 300.0 mg/L (ppb) and four chlorinated organic solvents were detected from 19 to 550 mg/L (ppb) (IT Corp. 1989a). The waste water was not analyzed for polychlorated biphenyls (PCBs) that might have been present in oil used historically as coolant.

After the tank was removed, six soil samples were used to characterize the tank excavation. The samples were collected from three locations, at two depths (5.5 and 7.5 ft bgs) at each location. The maximum concentration of volatile compounds in the soil vapor as determined by field headspace analysis was 2.5 ppm. Based on the field screening, two soil samples were submitted for off-site laboratory analysis for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Two VOCs were detected in the sample collected at depth of 5.5 ft bgs at the southeast corner of the tank excavation near the tank fill port. PCE was detected at 130 mg/kg, and TCA was detected at 5 mg/kg. PCE was also detected in the sample collected at 7.5 ft bgs at a concentration of 12 mg/kg. The VOC levels were several orders of magnitude below action levels derived in accordance with proposed Subpart S for PCE (10,000 mg/kg) and TCA (100,000 mg/kg) (EPA 1990b). No SVOCs were detected to indicate a release of coolant oil (IT Corp. 1989b). The soil was not analyzed for PCBs that might have been present in coolant oil or for metals that might have been released with the coolant waste water.

3.5 Assessment of Gaps in Information

Based on the data collected during the previous investigation (Section 3.5), an NFA was not proposed for this site under the ADS 1300 program. The RFI field investigation was designed to fully characterize ER Site 211 (Appendix C).

3.6 Confirmatory Sampling

This section provides a summary of the TA-I RFI for Site 211.

3.6.1 Project Summary

The objectives of the field investigation were to determine the potential vertical and horizontal extent of soil contamination around the former UST site. The constituents of concern (COCs) were developed based on past operation practices and from personnel communications. COCs include chlorinated solvents, metals, coolant oil, and PCBs.

The ER Site 211 field investigation started July 24, 1995 and was completed August 15, 1995. The field activities included soil borings, screening soil samples for PCBs with immunoassay kits, screening soil gas samples with flame ionization detector (FID) and/or gas chromatograph (GC), collecting soil and soil gas samples for chemical analysis, collecting waste samples for chemical and radiological analysis, managing the waste generated during drilling, and surveying soil borehole locations.

3.6.1.1 Health and Safety Monitoring

A photoionization detector (PID) was used to monitor the general background and breathing zone around the drilling area for organic vapors during soil borehole activities. The PID readings for the background and breathing zone were non-detects for all locations.

3.6.1.2 Drilling Program

The drilling program was conducted with a truck mounted Geoprobe® drill rig. A total of nine soil boreholes (T1211-GP-001 to T1211-GP-009) were placed around Former UST 840-1 (Appendix A, Figure 2). Soil borehole numbers, T1211-GP-011 to T1211-GP-016, were used to identify duplicate soil samples collected during the project.

The original drilling program was completed on July 28, 1995. On July 31, 1995, the Sample Management Office (SMO) informed the Assistant Task Leader (ATL) that soil samples collected from the July 27 and July 28 drilling activities had not been delivered to the laboratory on time and did not meet temperature control requirements for VOCs, SVOCs, and PCBs analysis. Based on discussion with the TL, the field crew returned to Site 211 on August 14, 1995 and redrilled soil borehole locations T1211-GP-006 through T1211-GP-009. These new soil boreholes were drilled within 2 feet of the original locations. All the new boreholes were drilled to the same depth and soil samples were collected to match the original sample intervals except for T1211-GP-009. The Geoprobe® hit refusal at 26.5 feet and a soil sample could not be collected at 30 feet.

3.6.1.3 Soil Gas and Soil Sample Collection

Soil gas samples were collected at 5-foot intervals at each location using the Geoprobe® drill rig and following SNL/NM draft FOP 94-21 (SNL/NM, 1994b). Soil gas samples were field screened for VOCs using a FID and/or portable GC. Upon completion of the screening, soil gas samples were collected in glass bulbs and prepared for shipment to the on-site SNL/NM Environmental Restoration Field Office (ERFO) laboratory for VOC analysis. In addition, confirmation samples were collected in Summa canisters and prepared for shipment to an off-site laboratory for VOC analysis. The samples collected and the analysis performed on these samples are listed in Table 1 (Appendix C).

The number of soil gas samples collected for VOC analysis included 37 samples screened using the FID or GC, 36 samples collected and sent to the ERFO laboratory, and 8 samples collected and sent to the offsite laboratory to confirm the ERFO laboratory results. The field GC unit was used to field screen only four samples (T1211-SVS-001 at 5 and 10 feet and T1211-SVS-002 at 5 and 10 feet), due to the slower turnaround time (compared to the FID) for receiving the results in the field; the ERFO laboratory was duplicating the analytical effort in both cases.

Soil samples were collected at 5-foot intervals at each location using a Geoprobe® equipped with a 1.5-inch (or 2.5-inch) outside diameter (O.D.) by 24-inch long core sampler which was lined with a cellulose acetate butyrate (CAB) sleeve. Upon the removal of the CAB liner from the sampler, the liner was cut into one 3-inch and two 6-

inch sections. One 3-inch section was used for the PCB immunoassay kit, one 6-inch section was sealed with tape and prepared for transport to the ERFO laboratory for VOC analysis, and one 6-inch section was sealed with tape and prepared for shipment to the offsite laboratory for VOC analysis. Samples collected for SVOC, PCB, and Target Analyte List (TAL) metal analysis were removed from the liner and placed in glass jars for shipment to the offsite laboratory. The samples collected and the analysis performed on these samples are listed in Table 1 (Appendix C).

Twenty-seven soil samples were collected and sent to the ERFO laboratory for VOC analysis and 18 samples for PCB analysis. To confirm the field screening and the ERFO analytical results, a total of twenty-five soil samples were collected for VOC analysis and six soil samples for PCBs, and sent to the Quanterra laboratory. In addition, 18 soil samples were collected at 10 and 15 feet from each of the 9 soil borehole locations for SVOC and TAL metals analyses and sent to the Quanterra laboratory.

The resampling of soil boreholes, T1211-GP-006 through -009, effected only the soil samples collected for VOC, SVOC, and PCB analyses. Since TAL metals did not require temperature control, metal analyses were completed from the original samples. All new soil samples were collected to match the original sample intervals except for T1211-GP-009-030, where the soil sample for VOC analysis could not be recollected. In addition, one new equipment blank rinsate, one new field blank, one new field duplicate, and two new trip blanks samples were collected and sent to the Quanterra laboratory for analysis. The analytical parameters associated with each original and resampled soil samples are shown in Table 1 (Appendix C).

3.6.1.4 Sample Packaging and Shipping

Soil gas samples sent to ERFO laboratory for VOC analyses were collected in one liter glass bulbs. Soil samples sent to ERFO laboratory were collected in CAB liners containing 50 ml of soil for the PCB immunoassay kits and 125 ml of soil for VOC analyses. These soil samples were placed on ice in the field and cooled to 4°C.

The soil gas samples sent offsite for VOC analysis were collected in Summa canisters provided by the laboratory. The soil gas samples were placed back into their shipping boxes and did not require cooling to 4°C. Soil samples sent to the offsite laboratory for VOC analyses were collected in CAB liners containing 125 ml of soil. SVOCs, PCBs, and TAL metals were collected in 500 ml glass bottles. The liners and bottles were labeled, sealed with custody tape, and placed in a protective bubble-wrap Ziplock bag. The samples were immediately placed on ice in the field and cooled to 4°C.

Samples were delivered to the SMO on a daily basis. SMO personnel performed cross-checking of the information on the sample labels against the data on the ARCOCs, and prepared the samples for shipment. Soil and soil-vapor samples were shipped by overnight delivery to the offsite laboratory for chemical analysis.

3.6.1.5 Surveying Sample Locations

All soil borehole locations were surveyed with Global Positioning System (GPS) equipment. The survey data included northing and easting coordinates for each borehole. The elevations of the boreholes were estimated using topographic maps.

3.6.1.6 Field Quality Control Samples

Four types of field QC samples were shipped for analyses during the field investigation: field duplicate soil and soil gas samples, equipment rinsate blank samples, soil and water trip blank samples, and field blank soil samples. In addition, three soil samples were designated for matrix spike/matrix spike duplicate (MS/MSD) analysis. Sample numbers, dates/times, locations, and analyses performed are presented on Table 1 (Appendix C).

A total of five field duplicate samples (four soil and one soil-vapor), were collected and analyzed for the same parameters as their corresponding soil or soil-vapor samples. The samples were collected by splitting the CAB sleeves crosswise in two pieces for VOC analysis. For SVOC and TAL metal analysis, soils were removed from the sleeves into a stainless steel bowl, composited, then transferred into glass bottles. Two duplicate soil samples (sample numbers 024761-01 and 024764-01) were not analyzed due to temperature control problems. Duplicate soil sample 025689-01 was collected during the resampling program.

A total of three equipment rinsate samples were collected from deionized water poured over the equipment after decontamination of the sampling equipment. The samples were analyzed for all parameters for which soil samples were analyzed. One equipment rinsate sample (sample number 024769) was analyzed only for metals due to temperature control problems. Equipment rinsate sample 024806 was collected during the resampling program.

A total of three field blank soil samples were exposed (open jar) to atmospheric conditions around the drilling/sampling operation and analyzed for VOCs only. The field blank samples, which consisted of glass bottles filled with clean soils, were supplied by SMO field office. One field blank soil sample 024778-01 was not analyzed due to temperature control problems. Field blank soil sample 025692-01 was collected during the resampling program.

Trip blank samples were submitted with each shipment which contained samples for VOC analysis. Aqueous trip blank samples were prepared by the offsite laboratory; the SMO field office prepared the soil trip blank samples. Ten trip blank samples (six soil and four aqueous) accompanied the sample containers to the field and back to the laboratory. Three trip blank samples (sample numbers 02477-01, 024783-01, and 024784-01) were not analyzed due to temperature control problems. Two trip blank samples (sample numbers 025690-01 and 025691-01) were collected during the resampling program.

Three MS/MSD analyses were requested, two for VOC analysis and one for SVOC analysis.

3.6.2 DATA MANAGEMENT

Data management was coordinated through the SMO and the ERFO laboratory. Upon sample shipment to the offsite laboratory, sample information was entered into a database to track the status of each sample. Upon completion of the laboratory analysis, the SMO received the analytical results in a summary data report and laboratory QC report. The ERFO laboratory oversight duties included pick up and delivery of the samples to the ERFO laboratory, providing soil gas sample containers, sample analysis, and producing a data summary report (Appendix D) for the TA-I Task Leader.

The data summary (Certificate of Analysis) reports for the offsite analyses were reviewed by the SMO for completeness and accuracy as required by SNL/NM TOP 94-03 (SNL/NM, 1994c). Data validation was performed using SNL/NM Data Verification/Validation (DV) Level 1 (DV1) and Level 2 (DV2) checklists. SMO submitted the original ARCOCs, the Certificate of Analysis Reports, and the DV1/DV2 review reports to the Environmental Operations Record Center. In addition, the laboratories submitted analytical data in an electronic format for loading into the ER data management system (ERDMS). All analytical data tables generated for this report were downloaded through the ERDMS except field screening data and ERFO laboratory data.

3.6.3 ANALYTICAL DATA SUMMARY

The sampling program used a multi-phase approach for analyzing soil gas and subsurface soil samples, including on-site field screening for VOCs with FID and/or GC, screening for PCBs with immunoassay kits, sending soil and soil gas samples to the ERFO laboratory, and sending soil and soil gas samples to the offsite laboratory.

3.6.3.1 Soil Gas Methods

All soil gas samples were screened for VOCs using a FID and/or portable GC. Soil gas samples sent to the ERFO laboratory were analyzed for VOCs by criteria described in EPA methods 8240/8260. The soil gas samples sent to the offsite laboratory were analyzed by EPA method T0-14.

3.6.3.2 Soil and Aqueous Methods

Soil samples sent to the ERFO laboratory were analyzed for VOCs by criteria described in EPA Methods 8240/8260. In addition, PCB soil samples were analyzed using immunoassay kits which were developed by EnSys, Inc., called PCBRIS[®]. The test kits were run for two detection levels 0.4 ppm and 50 ppm.

Soil samples sent to the offsite laboratory were analyzed by the following approved EPA methods: Methods 8240/8260 for VOCs, Method 8270 for SVOCs, Method 6010 for TAL metals, Methods 7471/7470 for mercury, Method 8080 for PCBs, and Method 7196 for hexavalent chromium.

3.6.3.3 Soil Gas Results

The results from the FID field screening were recorded on Soil Gas Monitoring Logs (Appendix E). The complete soil-vapor VOC results from the on-site GC and the ERFO laboratory are provided in table format in Appendix D. The offsite laboratory soil vapor VOC results are provided in Table 2 (Appendix C). The complete offsite analytical results for each soil vapor sample are provided in the Certificate of Analysis Reports.

The on-site field screening results for soil gas samples are as follows:

- The on-site FID results ranged from 0 to 4.8 ppm for 33 soil gas samples.
- The on-site GC unit detected trichloroethene (16 to 130 ppb) in three samples. In addition, one value of tetrachloroethene (80 ppb) and one value of toluene (200 ppb) were also observed.

The ERFO laboratory results for soil gas samples are as follows:

- A total of 36 soil gas samples were sent to the ERFO laboratory for VOC analysis. Due to the glass bulbs losing vacuum for three samples, T1211-SVS-004 at 10 feet, T1211-SVS-006 at 10 feet, and T1211-SVS-008 at 5 feet were not analyzed.
- The VOC compounds detected were trichloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethene. Trichloroethene was detected in two sample intervals, at 21.1 ppbv and 42 ppbv. 1,1-dichloroethene was detected in one sample at 78.2 ppbv. 1,1,1-trichloroethane was detected in ten sample intervals, with elevated values ranging from 12 to 51.8 ppbv. The remaining 22 samples were either non-detect or J values for VOCs.

The offsite laboratory results for soil gas samples are as follows:

- Four target VOCs (trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethene) were detected in each of five samples. Trichloroethene had elevated values ranging from 6.7 to 34 ppbv, tetrachloroethene had elevated values from 8.3 to 15 ppbv, 1,1,1-trichloroethane had elevated values from 12 to 72 ppbv, and 1,1-dichloroethene had elevated values from 2.2 to 29 ppbv.
- At the same five sample intervals, VOC compounds dichlorodifluoromethane (Freon 112) (2.1 to 7.9 ppbv), trichlorofluoromethane (Freon 11) (5.8 to 10 ppbv), and 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) (2.5 to 34 ppbv) were also detected. Freon is a known laboratory contaminant.
- The following compounds were detected in all or some of the samples: acetone (23 to 430 ppbv), 2-butanone (11 ppbv), 4-ethyl toluene (4.6 ppbv), and methylene chloride (2 ppbv). All of these compounds are common laboratory contaminants.

- Several other VOC compounds with elevated values include benzene (3.3 and 10 ppbv), carbon disulfide (130 ppbv), chloroform (3.7 ppbv), toluene (4.3 and 16 ppbv), 1,2,4-trimethylbenzene (2.3 and 5 ppbv), 4-methyl-2-pentanone (4.5 ppbv), and xylene (2.5 to 5.1).

3.6.3.4 Soil Sample Results

The ERFO laboratory soil analytical results for VOCs and PCBs are provided in table format in Appendix D. The offsite laboratory soil analytical results for detected VOCs are provided in Table 3 (Appendix C), for detected SVOCs in Table 4 (Appendix C), for PCBs in Table 5 (Appendix C), and for TAL metals in Table 6 (Appendix C).

The ERFO laboratory results for soil samples are as follows:

- The VOC analytical results were either non-detect or J values for all 27 samples except at one sample interval. For T1211-GP-003 at 30 feet, trichloroethene was detected at 2.8 ppb.
- The PCB analytical results were non-detect for all 18 samples.

The offsite laboratory confirmatory results for soil samples are as follows:

- The VOC analytical results were either non-detect or J values for all 25 samples except at one sample interval. For T1211-SVS-007 at 5 feet, acetone was detected at 20 ppb.
- The SVOC analytical results were either non-detect or J values for 18 samples.
- The PCB analytical results were non-detect for all 6 samples.
- The TAL metals were non-detect for antimony, cadmium, hexavalent chromium, mercury and silver. Other metals were present at varying concentrations, and are discussed in more detail in Section 3.7.2.

3.6.3.5 Quality Control Samples

All trip blanks either yielded non-detect or J values for all VOC analyses except for acetone at 69 ppb in T1211-TP-004 (Appendix C, Table 3). No acetone was detected in the samples associated with this trip blank sample. Soil sample and associated trip blank results indicate no significant sample contamination by VOC field and shipment sources.

All equipment rinsate blanks either yielded non-detect or J values for all VOC and SVOC analyses except for phenol at 19 ppb in T1211-EB-001 (Appendix C, Table 4). PCBs were non-detected. TAL metals were not detected above TA-I background levels.

All field blanks either yielded non-detect or J values for all VOC analyses (Appendix C, Table 3). The sample results indicate no sample contamination by VOCs during field activities or by vehicle traffic.

All field duplicate samples either yielded non-detect or J values for all VOC (Appendix C, Table 3) and SVOC analyses (Appendix C, Table 4). The corresponding samples also yielded non-detects or J values. In addition, the TAL metal results were within the detection range found in their corresponding samples (Appendix C, Table 6).

3.7 STATISTICAL ANALYSIS/EVALUATION OF CONCENTRATIONS

The data evaluation discussion is limited due to the very low-level values found during the soil gas investigation, VOCs showed either non-detect or J values for all soil samples except two, SVOCs either non-detect or J values for all soil samples, PCBs non-detects for all soil samples, and TAL metals below background levels or proposed Subpart S action levels for soils. Based on these reasons, no statistical analyses were completed for Site 211 except for TAL metals.

The data evaluation discussion is presented in the following order:

- Comparison of the soil gas data between the field screening with FID and/or portable GC results, the ERFO laboratory results, and the offsite laboratory results. In addition, the soil gas results were compared to the soil results.
- Comparison of the VOC and PCB soil data between the ERFO and the Quanterra laboratory results and proposed EPA Subpart S action levels for soils (EPA, 1990).
- Comparison of the Quanterra laboratory SVOC soil data results to proposed EPA Subpart S action levels for soil (EPA, 1990).
- Comparison of the TAL metals analytical results to the background soil data collected during the TA-I field investigation (SNL/NM, 1996), the site-wide study for SNL/NM (IT Corp., 1996), and EPA Subpart S action level for soils (EPA, 1990). For updated soil action levels, some values (i.e., zinc) were taken from "Report of Generic Action Level Assistance for the Sandia National Laboratories/New Mexico Environmental Restoration Program" (IT Corp., 1994). The generic values from this report were made current for guidance through June, 1994 according to RCRA proposed Subpart S methods. Any soil action level used from that report will be referred to as "generic action level for soils". For TA-I background metal analytical results, the UTL/95th percentile values were developed using the software package Statgraphics (SNL/NM, 1996).

3.7.1 Soil Gas Data Evaluation

The soil gas results were used as a qualitative measure to determine where to collect soil samples for chemical analysis. The soil gas readings (results) were not consistent between the FID and the laboratories. For example, at soil borehole location, T1211-SVS-002 at 25 feet, the FID reading was 1.6 ppm, the ERFO laboratory results were non-detect for VOCs and the offsite laboratory results detected nine VOC compounds at low concentrations (example; trichloroethene at 34 ppbv). The inconsistent results

could be the result of different methods and detection limits used by the ERFO and the offsite laboratory, in addition to the low concentrations detected.

To provide additional perspective on the soil gas VOC concentrations, Site 211 concentrations were compared to concentrations at other ER sites. At the Chemical Waste Landfill, the VOC soil gas plume was defined (with regulatory concurrence) using 100,000 ppbv total VOCs as the acceptable lower limit (SNL/NM, 1992). At ER Site 211 the maximum total VOC concentration was approximately 490 ppbv (ERFO laboratory data). This concentration is three orders of magnitude less than the minimum required contaminant concentration to be considered within the plume at the Chemical Waste Landfill.

Although some low-level concentrations of VOCs were detected in the soil gas samples, the corresponding soil samples were either non-detect or J values for VOCs except for one sample. At soil borehole location, T1211-GP-003 at 30 feet, trichloroethene was detected by the ERFO laboratory in the soil gas sample at 21.2 ppbv and was detected in the soil sample at 2.8 ppb. But the corresponding confirmation soil sample, analyzed by the offsite laboratory was non-detect (ranges from 5-10 ppb) for all VOCs including trichloroethene. Based on this additional data evaluation, VOCs in the soil gas should not be considered COCs for Site 211.

3.7.2 Soil Data Evaluation

The analytical results from the ERFO and the offsite laboratory found no VOC or PCB contamination in the soil. This conclusion is based on the following reasons:

- The ERFO laboratory VOC results were either non-detect or J values for all soil samples except trichloroethene (2.8 ppb) for soil borehole location T1211-GP-003 at 30 feet. A confirmation soil sample collected at this same location and sample interval was analyzed by the offsite laboratory for VOCs. The results were non-detect (ranges from 5-10 ppb) for all VOCs including trichloroethene. In addition, the trichloroethene detected value is well below the proposed Subpart S action level of 6,000 ppb. The remaining offsite laboratory VOC results were either non-detect or J values for all soil samples except acetone (20 ppb) for soil borehole location T1211-GP-007 at 5 feet. Acetone is a common laboratory contaminant. In addition if the acetone in this sample is not laboratory contamination it is well below the proposed Subpart S action level of 800,000 ppb. The remaining offsite laboratory data confirm the non-detect VOC analytical results produced by the ERFO laboratory. Based on the data evaluation, VOCs should not be considered COCs for Site 211.
- PCBs were non-detect for all soil samples analyzed by the ERFO laboratory (using immunoassay kits). The confirmatory soil samples analyzed by the offsite laboratory also were non-detect for PCBs, confirming the results of the ERFO laboratory. Based on this data evaluation, PCBs should not be considered COCs for Site 211.

All analytical results from the offsite laboratory for SVOCs was either non-detect or J values. Based on this data evaluation, SVOCs should not be considered COCs for Site 211.

The analytical results from the offsite laboratory for TAL metals were compared to background soil data collected during the TA-I field investigation then to SNL/NM site-wide background levels (IT Corp., 1996) and finally to EPA proposed Subpart S action levels for soils (EPA, 1990) (Appendix C, Table 7). TAL metals were non-detect for antimony, cadmium, hexavalent chromium, mercury and silver. The remaining metals are within TA-I background levels, SNL/NM background levels, and/or proposed Subpart S and generic action levels except for calcium. Calcium is a common cation and is not a COC at Site 211. Based on the comparisons provided in Table 7 (Appendix C), no metals are considered COCs for Site 211.

3.8 Ecological Evaluation

The purpose of this section is to provide a preliminary ecological evaluation of the potential contaminants of concern associated with the Building 840 Former Underground Storage Tank 840-1, Site 211. Former Underground Storage Tank 840-1 is located southeast of Building 840 at the intersection of H and 9th Street. This site is located inside the secured area of TA-I. TA-I is a major industrial area for SNL/NM with few open areas for wildlife or ecological species to inhabit. The underground storage tank stored waste water from the ceramic shop housed in Building 840.

During the removal of the underground storage tank, a 13-ft by 6-ft excavation was dug to an average depth of 4.5 ft. No contaminated soil was visible during this process. Soil sampling was performed after the tank was removed. All volatile concentrations were below 100 ppm. After the tank excavation was complete, the hole was backfilled with clean sand and paved with concrete. This site is surrounded by concrete as well, with a sidewalk on the south side and buildings on the other three sides.

No exposure pathways exist for ecological receptors. Due to the lack of contamination and exposure pathways at this site, no further ecological evaluation will be performed. The site does not present a danger to ecological species and should be considered for no further action.

4.0 RATIONALE FOR PURSUING A CONFIRMATORY SAMPLING NFA DECISION

Nine soil borehole locations were drilled around the former UST. The data evaluation shows no VOC, SVOC, PCB, or TAL metals contamination either above background levels or above Subpart S action levels. Based on the field investigation, a NFA is recommended at Site 211 for the following reasons:

- No VOCs were detected except one slightly elevated value of trichloroethene and one slightly elevated value of acetone based on the ERFO and the offsite analytical results. The two elevated values are well below proposed Subpart S action levels for soil.
- No SVOCs were detected based on the offsite analytical results.
- No PCBs were detected based on the immunoassay kits and the offsite analytical confirmatory results.

- All TAL metal results either yielded non-detect or were within TA-I and SNL/NM background levels or below proposed Subpart S and generic action levels.

5.0 CONCLUSION

Based on site history and the data evaluated from the field investigation, further investigation and/or a VCM are not required for Site 211. Therefore, it is requested that Site 211 be recommended for an NFA determination.

6.0 REFERENCES

6.1 ER Site References

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- Helgesen, R.F., 1990. UST Removal/Closure Checklist [for UST 840-1], Sandia National Laboratories, New Mexico.
- IT Corporation, 1996, "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico, Environmental Restoration Project and the Kirtland Air Force Base Installation Restoration Program."
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- IT Corporation, 1989a. Results of Building 840 Waste Storage Tank Sampling. Letter to P. Pei, Sandia National Laboratories, February 3, 1989.
- IT Corporation, 1989b. "SNLA Tank 840-1 Soil Survey Report," April 1989.
- Sandia National Laboratories/New Mexico (SNL/NM), 1996, "TA-I Background Field Investigation Data Evaluation Report."
- Sandia National Laboratories/New Mexico (SNL/NM), 1995, "Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan", Environmental Restoration Program, Sandia National Laboratory, U.S. Department of Energy, Albuquerque Office, February 1995., [Includes: Interview notes and records of telephone conversations with current and retired SNL/NM employees 1 through 51. Communication made from February through June 1993, as part of ER Program background investigation of TA-I ER Sites. SNL/NM Environmental Operations Record Center maintains these personal communications notes as a controlled document.]
- Sandia National Laboratories/New Mexico (SNL/NM), 1994b, Shallow Soil Gas Sampling," FOP 94-21, Rev. 0, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1994c, Verification and Validation of Chemical and Radiochemical Data," TOP 94-03, Rev. 0, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1992. "Chemical Waste Landfill Closure Plan and Post Closure Permit Application." Environmental Restoration Program, Sandia National Laboratories, U.S. Department of Energy, Albuquerque, Operations Office. December 1992.

Stanford, D.J., 1989. Assessment for Release at Underground Storage Tank (UST) 840-1 Removal Site. Letter to A.R. Chernoff (DOE/AL), May 4, 1989.

6.2 Reference Documents

New Mexico Environmental Department (NMED), 1995, "Environmental Restoration Document of Understanding", New Mexico Environmental Department, US Environmental Protection Agency, US Department of Energy, Los Alamos National Laboratory, and Sandia National Laboratory/New Mexico, November 1995.

Sandia National Laboratories/New Mexico (SNL/NM), 1994, "Program Implementation Plan for Albuquerque Potential Release Sites", [DRAFT], Environmental Restoration Program, Sandia National Laboratories, U.S. Department of Energy, Albuquerque Operations Office, September 1993.

U.S. Environmental Protection Agency (EPA), 1992, "Module IV of RCRA Permit No. NM5890110518, EPA Region VI, U.S. Environmental Protection Agency. Issued to Sandia National Laboratories, Albuquerque, New Mexico.

U.S. Environmental Protection Agency (EPA), 1990, "Proposal Rule, Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities (Subpart S)." U.S. Environmental Protection Agency, 55 FR 30798, July 27, 1990.

U.S. Environmental Protection Agency (EPA), 1987, "Final RCRA Facilities Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico." Prepared by A.T. Kearney, Inc., and Harding Lawson Associates under Contract No. 68-01-7038, April 1987.

6.3 Aerial Photographs

No specific aerial photographs were used to support this NFA.

APPENDICES

Appendix A ER Site 211 Figures

Appendix B Section 5.9 of the TA-I RFI Work Plan (SNL/NM, 1995)

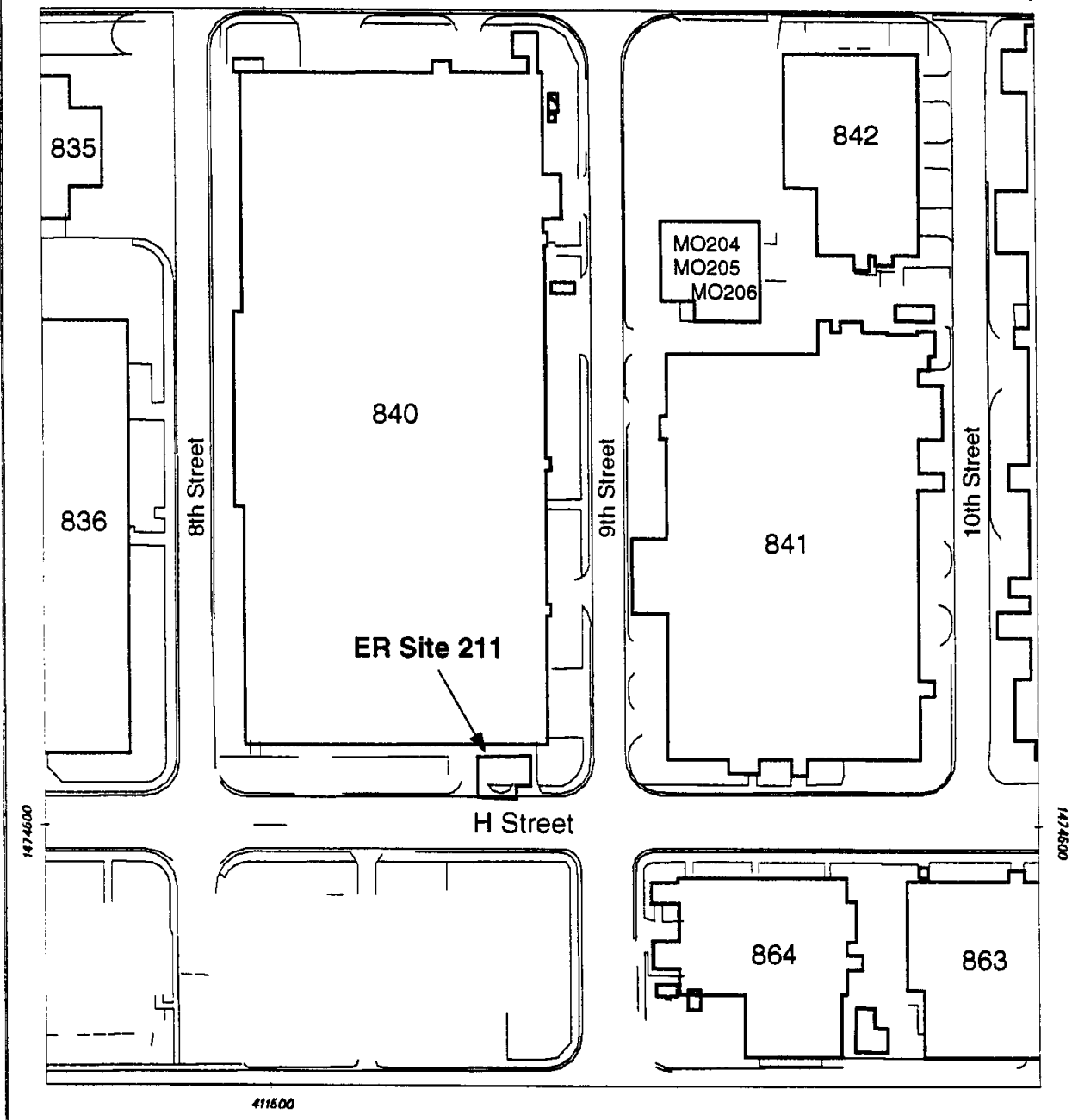
Appendix C ER Site 211 Tables

Appendix D ERFO Laboratory Data Report




Appendix E ER Site 211 Soil Gas Monitoring Logs

Appendix A

ER Site 211 Figures



Legend

-  **ER Site 211**
-  **Roads**
-  **Buildings**

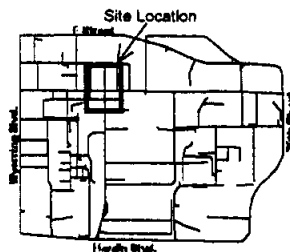
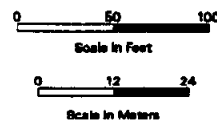
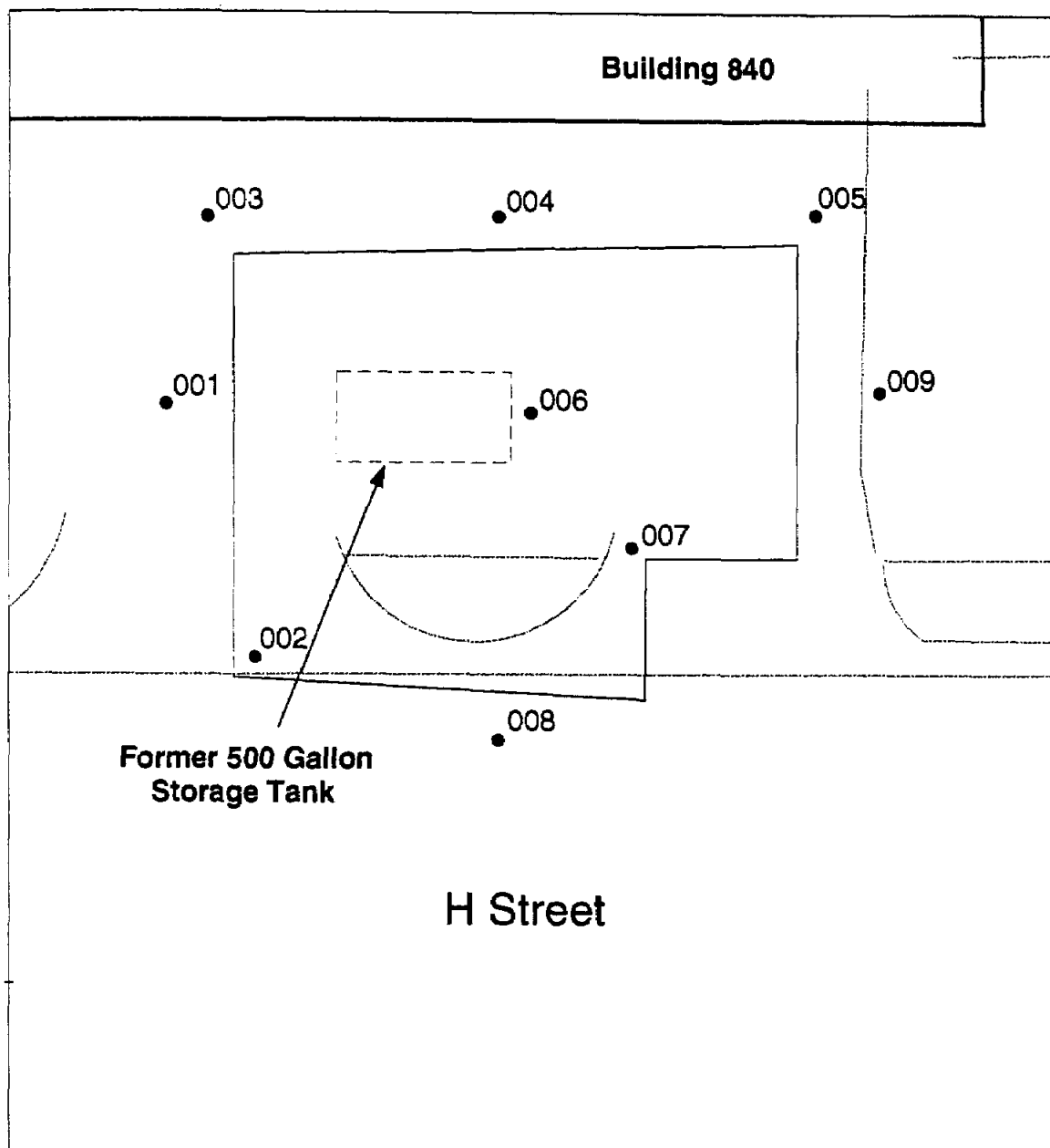


Figure 1
**ER Site 211
Location Map**





Legend





-  ER Site 211
-  Building
-  Roads
-  Soil/Sov Sampling Locations
T1211-GP-

Figure 2
ER Site 211
Soil/Sov Boring Location Map



Appendix B

Section 5.9 of the TA-I RFI Work Plan (SNL/NM, 1995)

5.9 ER Site 211, Building 840 Former UST 840-1

5.9.1 Site Description and History

ER Site 211 is a former steel UST location near Building 840 in TA-I that was operational from 1954 until 1989 (Figure 5-28). The tank was registered with the NMED UST Bureau as UST No. 840-1 and was located about 15 ft south of Building 840. The UST had a capacity of 500 gallons and, at the time of its removal, stored waste water from the ceramic shop housed in the building (Personal Communication, Employee 27, 1993). The waste water, derived from coolant water used in milling and machining operations, reportedly contained lead titanite and lead oxides (EPA 1987a). Release of waste water from the UST to the environment has been attributed to tank operator spillage (Bohannon 1989). Information suggests that prior to its use for waste water coolant storage, the tank was used to store waste oil coolant from the machining operations (Personal Communication, Employee 27, 1993).

No inventory control or precision testing data about the tank were maintained. No piping was connected from the building to the tank and it was apparently hand-filled from a port on its southeast end. The base of the tank was at a depth of about 4 ft bgs; no information has been located that indicates it was ever mounted to a concrete pad. The tank did not have secondary containment, overfill protection, or leak detection systems. About one foot of earthen fill material covered the tank, including several in. of concrete pavement. The soil immediately underlying the tank site consists of unconsolidated sand and gravel.

The tank was removed on February 23, 1989 as part of a routine tank upgrade project. Prior to the tank pull, no releases had been officially reported for the UST system. Several SNL/NM and contractor organizations were involved in the tank removal operation (Helgesen 1990; Stanford 1989). SNL/NM and IT Corporation personnel collected water samples from the tank and soil samples from beneath the tank (IT Corp. 1989a, b). Regulatory agency personnel did not observe the tank removal operation.

To remove the UST, a 13-ft by 6-ft excavation was dug to an average depth of 4.5 ft. Stained soil was not visible in the tank excavation. The tank was visually inspected during the tank removal operation; no perforations were evident. After soil samples were collected, the tank excavation was backfilled with clean sand and paved with concrete (IT Corp. 1989b).

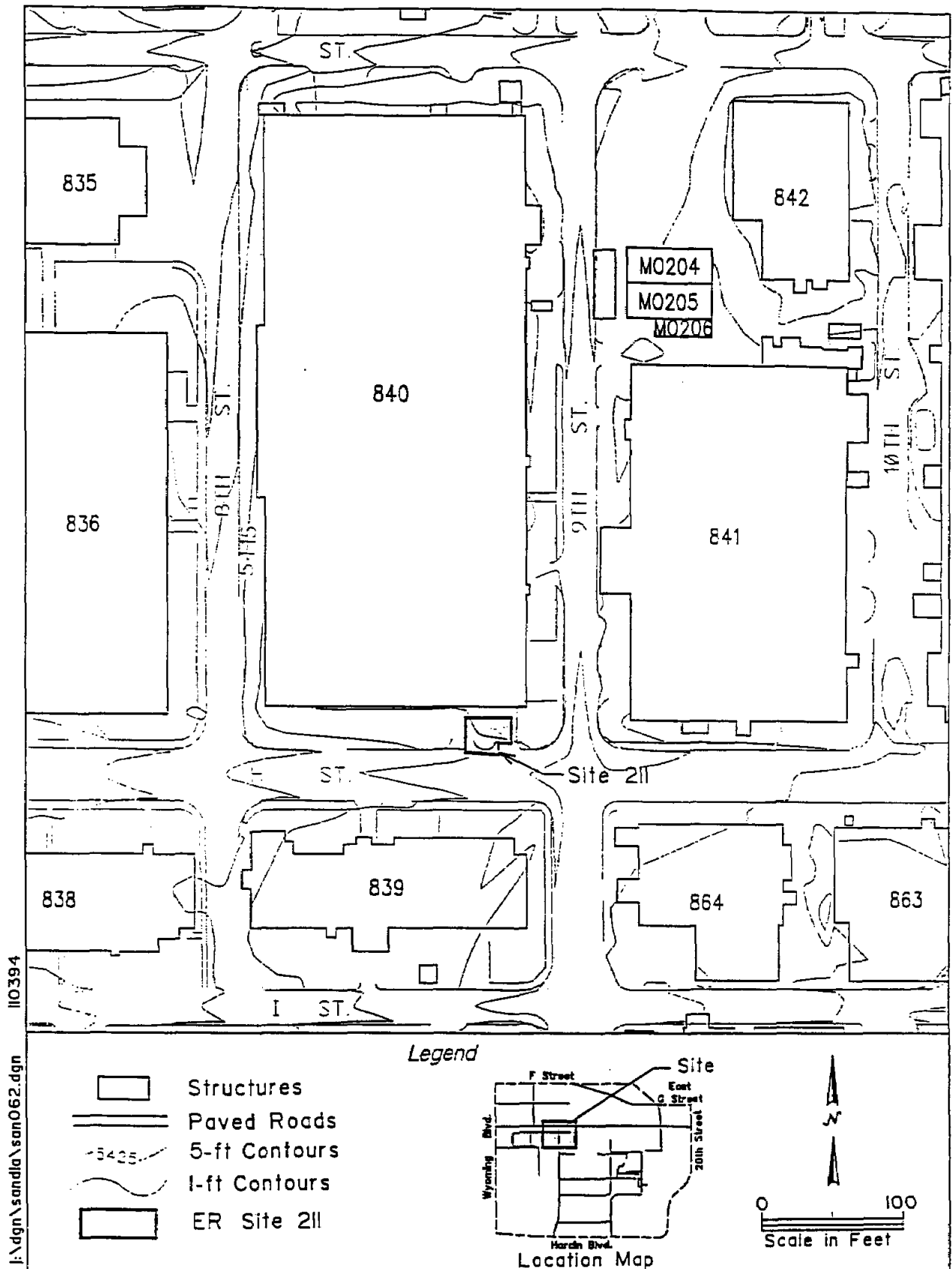


Figure 5-28
Location of ER Site 211: Building 840 Former Underground Storage Tank 840-1

Volatile concentrations in the soil as determined using a field headspace method were below the 100 ppm (mg/kg) TPH guidance standard set by NMED for UST sites. SNL/NM sent a tank closure notification letter to the NMED UST Bureau on May 12, 1990 (Bohannon 1989). At this date, a closure acceptance letter has not been received from NMED.

5.9.2 Previous Investigations

5.9.2.1 Sampling of Tank Contents

The tank contents were sampled on October 5, 1988, in preparation for tank removal, and analyzed for metals and TOX. Separate liquid phases were observed at the liquid surface in the tank. Therefore, a peristaltic pump was used to make one composite liquid sample with water collected at 6-in. depth intervals throughout the tank. Upon receipt of an elevated TOX analysis, a second water sample was collected on October 28, 1988, with a Coliwasa sampler to determine the identity of the halogenated compounds. Both water samples were analyzed at an off-site analytical laboratory (IT Corp. 1989a).

In the original sample, ten metals were detected; copper had the greatest concentration at 25.0 mg/L (ppm). The concentration of TOX in the original sample was 2.1 mg/L (ppm). In the second waste water sample acetone was detected at a concentration of 300.0 μ g/L (ppb) and four chlorinated organic solvents were detected from 19 to 550 μ g/L (ppb) (IT Corp. 1989a). The waste water was not analyzed for PCBs that might have been present in oil used historically as coolant.

5.9.2.2 Soil Sampling at Excavation

After the tank was removed, six soil samples were used to characterize the tank excavation. The samples were collected from three locations (Figure 5-29), at two depths (5.5 and 7.5 ft bgs) at each location. The maximum concentration of volatile compounds in the soil as determined by field headspace analysis was 2.5 ppm. Based on the field screening, two soil samples were submitted for off-site laboratory analysis for VOCs and SVOCs. Two VOCs were detected in the sample collected at depth of 5.5 ft bgs at the southeast corner of the tank excavation near the tank fill port (Figure 5-29). PCE was detected at 130 μ g/kg TCA was detected at 5 μ g/kg. PCE was also detected in the sample collected at 7.5 ft bgs at a concentration of 12 μ g/kg. The VOC levels were several

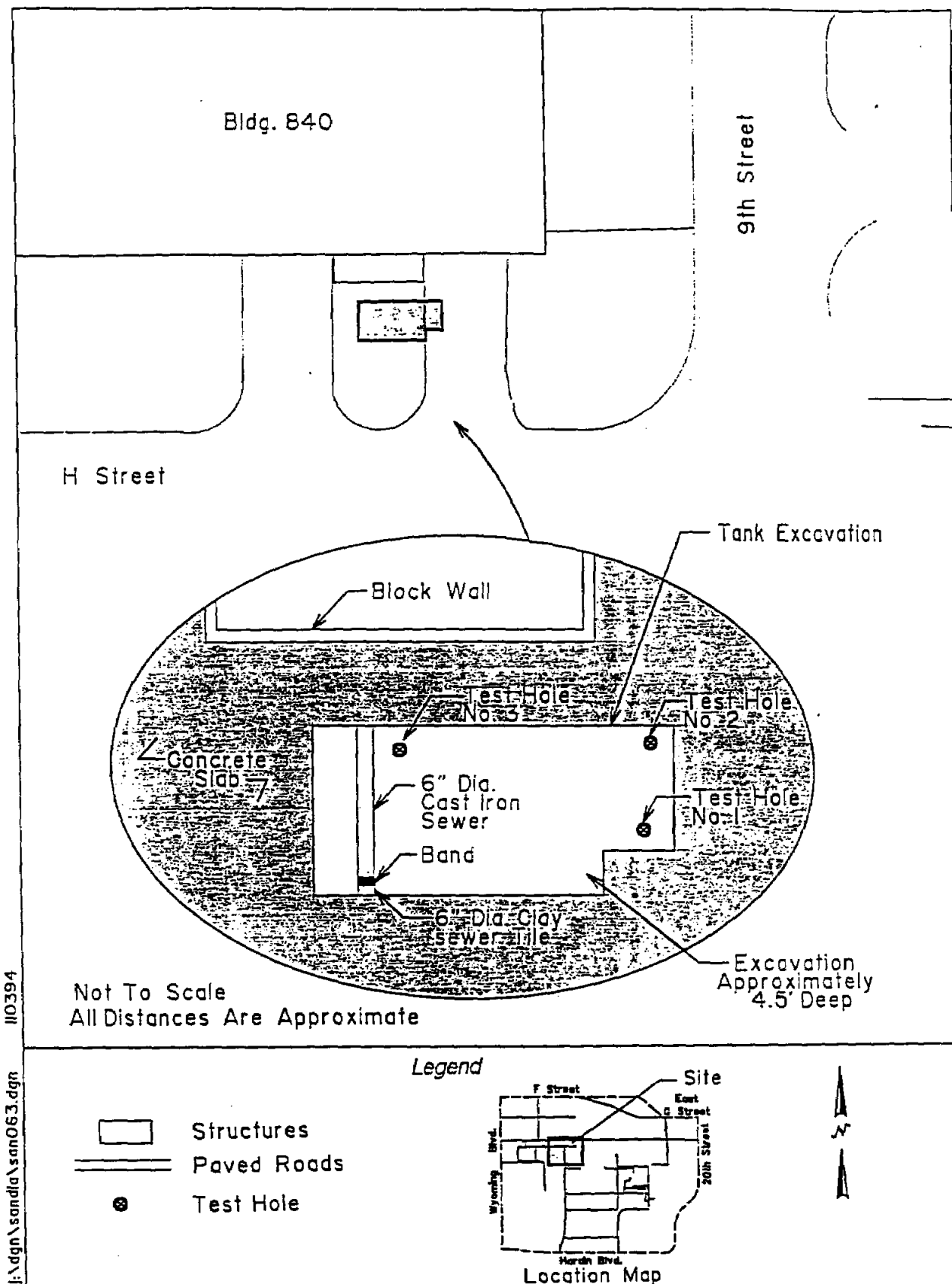


Figure 5-29
ER Site 211: Location of Samples Collected in Excavation
at Time of Tank Removal, March 6, 1989.

orders of magnitude below action levels derived in accordance with proposed Subpart S for PCE (10,000 $\mu\text{g/kg}$) and TCA (100,000 $\mu\text{g/kg}$) (EPA 1990b). No SVOCs were detected to indicate a release of coolant oil (IT Corp. 1989b). The soil was not analyzed for PCBs that might have been present in coolant oil or for metals that might have been released with the coolant waste water.

5.9.3 Nature and Extent of Contamination

The available analytical results indicate that chlorinated organic solvents were constituents of the waste that was stored in the UST at the time of its removal and that a possible release of the waste to the soil occurred at the site of the former UST 840-1 at Building 840. Soil data indicate that possible contamination by VOCs extends vertically to a depth of at least 7.5 ft. bgs. The vertical extent has not been bounded but the level of VOCs in the 5.5 ft bgs sample was an order of magnitude greater than that at 7.5 ft bgs, indicating that the contamination may not extend to a much greater depth. The lateral extent to the north and northwest were indicated by the data. No VOCs were detected in a sample collected approximately 5 ft north or in a sample collected approximately 5 ft north and 11 ft west of the contaminated sample. The lateral extent of the possible contamination to the south and east has not been determined. While the soil investigation at the time of the tank removal indicated that VOC concentrations were below proposed Subpart S action levels (EPA 1990b), additional sampling will be carried out during this RFI to verify the findings.

No SVOCs were detected in the soils at the assumed source, therefore no additional investigation for SVOCs is required. Because no metals analysis has been performed on the soils, no information regarding potential metals contamination is available.

5.9.4 Conceptual Model

The conceptual model for releases from ER Site 211 is based on available historical information and data collected during limited previous investigations. The potential COCs for the site are chlorinated organic solvents, coolant oil, and metals (including hexavalent chromium) from the waste water. PCBs are also suspected because coolant oil was used historically at Building 840 and the waste oil was stored in the UST (Personal Communication, Employee 27, 1993).

Based on available data, the potential COCs would not be expected to migrate substantially from the release site, nor be present in concentrations which pose a risk to human health or the environment.

The potential for vertical migration of most metals and PCBs is limited by their low solubilities and tendency to adsorb to the clay fraction of the soils. The mobility and persistence of chlorinated solvents in the environment is well documented (ATSDR 1988; Kloepper *et al.* 1985; Wilson and Wilson 1985; Cline and Viste 1985; Barrio-Lage *et al.* 1986). The mobility of common solvents through the vadose zone is greater than that of metals. The dominant process for removing these solvents from shallow soil is volatilization into the atmosphere. Most chlorinated solvents are considered to have a medium mobility through soil and tend to move in an aqueous phase. However, information gathered at other sites at SNL/NM indicate that these solvents may show significant migration in the gaseous phase in the arid soils at SNL/NM (SNL/NM 1992e). In the absence of biodegradation or volatilization, chlorinated solvents may be relatively persistent in the environment. Likewise, the mobility and persistence of PCBs is well understood (Erickson 1986; EPA 1979). Because PCBs are relatively inert compounds, dispersion and accumulation in the environment are important factors in the fate of PCB contamination. With a low water solubility and a high viscosity in the oil state, the adsorbed phase of PCBs is the most important mechanism for migration. PCBs are strongly adsorbed to organic matter but much less readily to minerals (Schwartz, Cherry, and Roberts 1982).

A release from the Building 840 Former UST Site would not pose a direct risk to human health and the environment. Any potentially contaminated soil lies at least 4.5 ft. bgs, which does not allow for direct human contact with any COCs in the soil. While the contaminated soil has not been removed or remediated, the area has been paved with concrete. Unless the site is accessed for construction purposes, there should be no direct contact with the affected soils via inhalation, ingestion, or dermal exposure. If construction is required, proper precautions will be taken to protect site workers. Five hundred feet separate the potential release source and the local aquifer (DOE 1993), limiting the potential risk to potable water quality.

Although discharges ceased in 1989 with the tank removal, there remains a potential pathway to the surface via advection in pore spaces. Should the pavement be removed, there would be an increase in contaminant mobility due to the chlorinated solvent compounds' high volatility and solubility and thereby an increase in the potential for human and environmental exposure. With the removal of surface paving, surface water runoff from the building could infiltrate the soil, creating a pathway for VOCs through the vadose zone. If there was sufficient infiltration through the source, the chlorinated solvents might eventually migrate to the saturated zone. In this case, ground water would provide a

pathway for contaminant migration. If excavated, the soil provides a direct migration pathway via dispersal with windborne particulates or overland flow with surface water runoff.

The information available on the solvent release from the UST allows a preliminary identification of corrective measures options. These include maintaining the concrete cover and implementing institutional controls; excavation and removal; and *in situ* and *ex situ* chemical and/or biological treatment.

Maintaining the concrete cover will prevent dispersal of the solvent vapors and infiltration through the soil. Institutional controls restricting access and requiring long-term monitoring and maintenance coupled with the cover, would prevent human exposure to the source and would ensure the structural integrity of the cover. Depending on the constituents detected in the soil, the soils could be excavated and removed for treatment off site at a licensed facility by incineration (if only organic compounds are present) or other means demonstrated to achieve the LDR BDAT standards. Possible on-site treatment methods for organic compounds include *ex situ* vapor extraction, biological treatment in a bioreactor or landfarm, thermal desorption, or flushing. Possible *in situ* treatment methods include vapor extraction, bioremediation, or flushing.

5.9.5 Sampling Plan

Chlorinated solvents are known to be present at lower concentrations in soils on the south side of Building 840 in the location of the former UST 840-1. Waste coolant water and oils, containing chlorinated solvents, metals, and possibly PCBs, may have been released to the soils during transfer to the tank.

General DQOs for TA-I RFI are specified in Section 4.3. Specific DQOs for the Building 840 Former UST 840-1 site investigation include:

- Determining if any solvents, metals, coolant oil, or PCBs have been released to the soils underlying the location of the former Building 840 UST.
- Characterizing the vertical and horizontal extent of potentially contaminated soil by collecting analytical samples from deep boreholes (Analytical Level II and Level III data).
- Producing data of adequate quality (Level III) for 20 percent of deep borehole samples so that risk calculations may be performed and corrective measures may be evaluated.

The DQOs will be achieved through implementation of the sampling strategy outlined below. Data will be collected during surface soil sampling, shallow subsurface soil gas and soil sampling, and deep soil gas and soil boring investigations. If contaminants are detected in the soil gas or shallow subsurface soil samples at concentrations above the action levels, additional samples will be collected. Analytical Levels I, II, and III will be required for analytical procedures under this plan.

5.9.5.1 Shallow Subsurface Soil Gas Investigation

Shallow subsurface soil gas screening samples (referred to herein as Geoprobe soil gas samples) will be collected using the Geoprobe at locations identified as potential areas of concern. These screening samples will be collected within the top 30 ft of soil to determine whether VOCs were released to the environment. If VOCs are present in the soil, the screening data will guide soil sample selection and selection of borehole locations and analytical parameters.

5.9.5.1.1. Data Collection

At selected sampling locations, the Geoprobe will be advanced into the ground surface and soil gas samples will be collected at 5-ft intervals for field screening for VOCs with a FID, beginning at 5 ft bgs, which is the approximate depth of the previous excavation. To maximize the chance of detecting COCs, the FID will be calibrated to TCA, PCE, or to a calibration gas with a similar response factor. Depending upon availability, a small field GC unit such as a Photovac 10S may be used in place of the FID. If VOCs are detected by the FID or GC, the sample will be submitted to the on-site laboratory for TCL VOCs analysis. Splits of at least 20 percent of the samples submitted for on-site analyses will be collected for off-site laboratory analysis. Sampling will continue until no VOCs are detected by field screening in two consecutive intervals. The samples collected at the two deepest intervals will be submitted to the on-site laboratory for verification analysis.

Samples will be collected at nine sampling locations surrounding the location of the former UST at Building 840 (Figure 5-30). Five samples will be collected from the previously excavated area, one at the approximate center and one from each corner. Four more will be collected approximately 5 feet from the perimeter of the excavated area in the four compass directions from the center so that the lateral extent of any contamination may be determined.

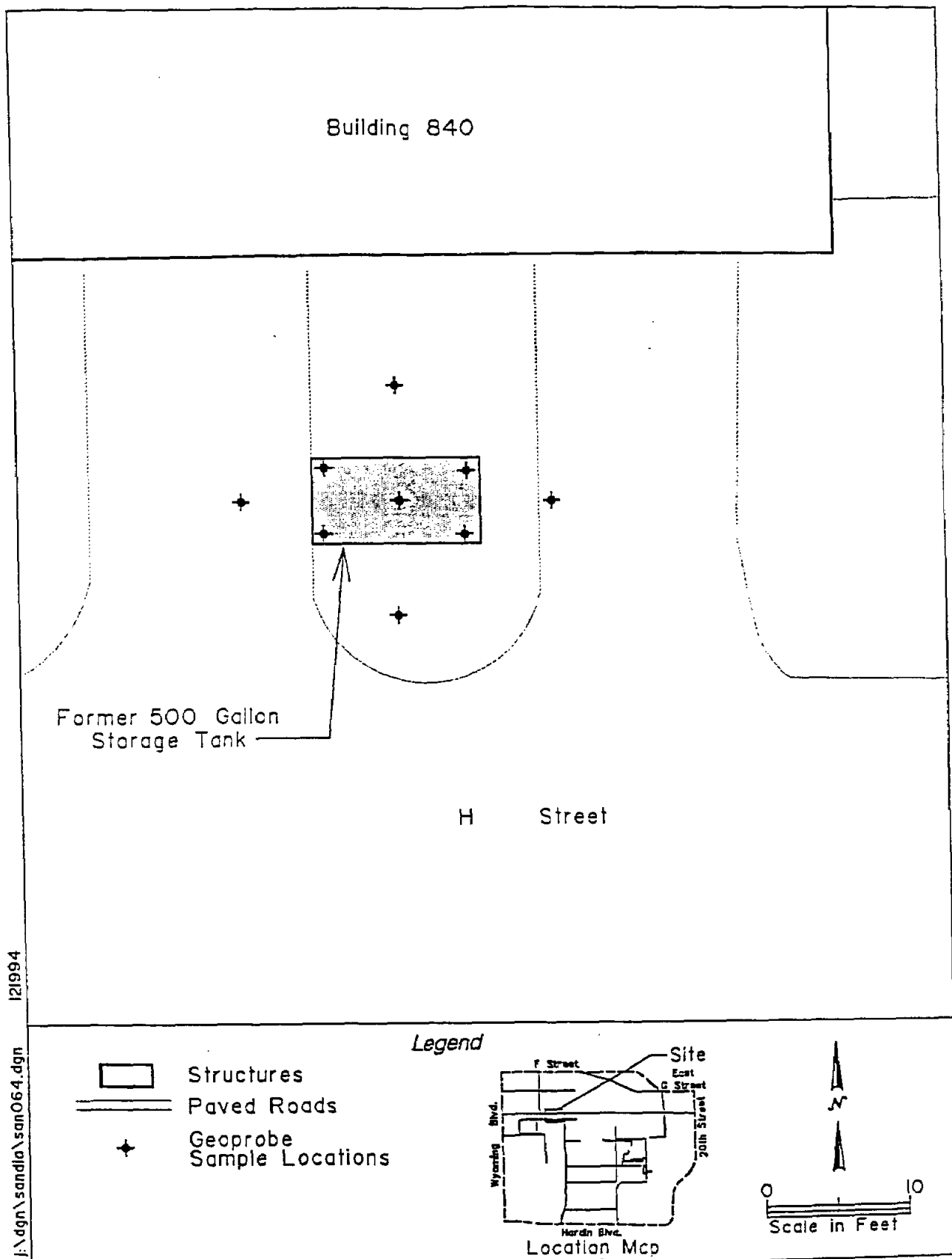


Figure 5-30
ER Site 211: Proposed Sampling Locations

5.9.5.1.2. Analytical Parameters

Table 5-21 at the end of this subsection lists environmental, QA/QC, and waste management samples to be collected at the Building 840 Former UST 840-1 site during Geoprobe soil gas sampling. Geoprobe soil gas samples will be field screened for VOCs using a FID or GC, as described above. As shown in Table 5-21, Geoprobe soil gas samples which contain detectible levels of VOCs using field screening will be analyzed at the on-site laboratory for the full suite of TCL VOCs, targeting TCA and PCE.

5.9.5.2 *Shallow Subsurface Soil Investigation*

5.9.5.2.1. Data Collection

Geoprobe shallow subsurface soil sampling (herein referred to as Geoprobe soil sampling) will be performed concurrently and at the same locations as the Geoprobe soil gas sampling locations. As the soil gas survey is being conducted, soil from each interval sampled will also be collected for field screening, lithologic logging, and possible laboratory analysis. Split samples will be collected at each interval. One split from each interval will be sealed, labeled, and held for possible laboratory analysis. The other split will be field screened for VOCs and PCBs, logged, and then disposed of as IDW. Soil screening methods include headspace analysis using a FID or GC for volatile organic compounds, as described in the data collection procedures of Section 5.9.5.1 for Geoprobe soil gas sampling and immunoassay methods for PCBs. If PCBs are not detected in samples from two consecutive depths, PCB screening at deeper intervals at that location will be discontinued. The two soil samples from the shallowest intervals for which no VOCs and the two for which no PCBs were detected by the field screening as well as the samples with the highest VOC and PCB concentrations will be submitted for on-site (Level II) laboratory analysis.

After the Geoprobe soil sampling, samples for metal and SVOC analysis will be collected from the same locations at two depths: 9.5-10 ft. bgs and 14.5-15 ft. bgs (*i.e.*, approximately 5 and 10 feet below the bottom of the tank). A mechanical auger, such as a truck-mounted auger, will be used to reach the sample horizon and a hand-held bucket auger will be used to collect the sample. The auger samples will be submitted to an off-site analytical laboratory for analysis.

5.9.5.2.2. Analytical Parameters

Environmental, QA/QC, and waste management samples for the shallow subsurface soil samples are listed in Table 5-21 at the end of this subsection. Samples will be field screened by headspace analysis for VOCs using a FID or GC, and for PCBs by an immunoassay method using a field kit. The Geoprobe soil samples will be analyzed at the on-site laboratory (Level II) for VOCs and/or PCBs, depending upon the field screening results. The auger samples will be analyzed at the off-site laboratory for TAL inorganics, hexavalent chromium, and SVOCs (Level III). Twenty percent of the samples will be shipped to an off-site laboratory for verification analyses.

5.9.5.3 *Borehole Investigation*

Based on shallow subsurface sampling results, additional samples may be collected to determine the extent of releases from the Building 840 Former UST. Borings will be completed at locations that had positive detection of VOCs in soil collected at the maximum depth (28 to 30 ft. bgs) attainable with the Geoprobe sampler, or if metals or SVOCs are detected at the 10 ft depth in concentrations which exceed risk-based (for the organic compounds) or SNL/NM background (for the metals) levels.

5.9.5.3.1. Data Collection

One borehole will be placed at the Geoprobe soil sampling location where potential COCs were previously detected. The other boreholes (to a maximum of three) will be equally spaced around the central borehole if access allows. The number of perimeter boreholes and the distance from these boreholes to the central borehole will be based on the depth of contamination and site clearance/access issues. If multiple adjacent Geoprobe soil gas or soil sampling locations identify possible contamination in the deepest sample interval, surrounding each Geoprobe sampling locations with boreholes may be inefficient. In this case, the deep borehole locations may be optimized to characterized the entire group of Geoprobe soil sampling locations.

At each borehole location, a hollow-stem auger will be used to collect soil samples for field screening, lithologic logging, and for laboratory analysis (Level II or III). Borehole sampling will be initiated at the depth of the potentially contaminated shallow subsurface sample. Samples will be collected at 5 ft intervals from 50 ft, at 10 ft intervals from 50 to 100 ft, and at 20 ft intervals at depths greater than 100 ft. The boreholes will be drilled until two samples are determined to be

uncontaminated by means of field screening or on-site analysis, as appropriate, or to the depth limits of the drilling method. Sampling will then be terminated.

Soil gas will also be collected for on-site laboratory analysis (Level II). Soil gas samples will be collected at the intervals described above for field screening with a FID or GC. Field screening will be carried out as described for the data collection in Section 5.9.5.1 for Geoprobe soil gas sampling. To maximize the chance of detecting COCs, the FID will be calibrated to TCA, PCE, or to a calibration gas with a similar response factor. Depending upon availability, a small field GC such as a Photovac 10S may be used in place of the FID. If VOCs are detected by the FID or GC, the soil gas sample will be submitted to the on-site laboratory for full-suite VOC analysis. Splits of at least 20 percent of the samples submitted for on-site analysis will be collected for off-site laboratory analysis.

Split samples of soil will initially be collected at the two shallowest 5 ft intervals. One split from each depth will be sealed, labeled, and held for possible off-site laboratory analysis. If VOCs or PCBs are the possible COCs, a second split will be field screened as described in the data collection procedures for the Geoprobe soil gas investigation (Section 5.9.5.1). If metals are a potential COC, a separate split will be analyzed at the on-site analytical laboratory for the metals under investigation. If no COCs are detected by the screening and/or the on-site laboratory, then these two 5-ft samples will be considered uncontaminated and sent for confirmatory off-site analysis. If COCs are detected in one of the first two samples, then the borehole will be advanced and sampled at the intervals described above until no VOCs are detected in two consecutive intervals. To meet the sampling objectives described above, at least 20 percent of the samples will be submitted for off-site verification analysis, including the sample showing the highest screening or on-site laboratory value for each COC under investigation (to characterize the nature of the COCs) and one sample from each of the two deepest uncontaminated sample intervals (to characterize the vertical extent of COCs). Other samples may be collected by the field geologist (to a maximum of five samples), using professional judgement, to be representative of the sample set. Core material not submitted for analysis will be disposed of as IDW.

If boreholes are determined to be necessary, they will be located as described above. For planning purposes, borehole depth is estimated to range from 40 to 140 ft, but the depth may be extended based on the field screening data. Actual depth of vertical sampling may vary according to field

conditions and the equipment capabilities. At least three soil samples will be collected from each borehole as well as additional QA/QC samples.

5.9.5.3.2. Analytical Parameters

Table 5-22 for borehole samples at the end of this subsection is an example table; it lists the environmental, geotechnical, QA/QC, and waste management samples for a single borehole. Soil gas and soil samples collected during 1
shown in Table 5-22, borehole soil screening will be analyzed at the o
and PCE. Soil samples collected c
detected in the shallow subsurface
metals will be analyzed for hexaval
will be shipped to an offsite laboratory for verification analyses (Level III).

Keep
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COC, the samples collected for
At least 20 percent of the samples

October 13, 2003

ADDITIONAL /SUPPORTING DATA

**CAN BE VIEWED AT THE
ENVIRONMENTAL, SAFETY, HEALTH
AND SECURITY (ES&H and Security)
RECORD CENTER**

**FOR ASSISTANCE CALL
844-4688**